

## **REMARKS**

Claims 1-40 are pending in the subject application. Claims 19-39 were withdrawn subject to a restriction requirement. Applicant has amended claim 18 in order more particularly point out and distinctly claim the subject matter which applicant regards as the invention. Applicant has not added or deleted any claims. Accordingly, claims 1-18 and 40 are presently being examined.

In view of the following Amendment and Response, applicant respectfully requests that the Examiner reconsider and withdraw the rejections made in the outstanding Office Action.

### **Support for the Amendments**

Applicant has amended claim 18 in order more particularly point out and distinctly claim the subject matter of applicants' article having a catalyst composite with a close coupled upstream section and a downstream section and method of forming same. Specifically, applicant has amended claim 18 to delete "upstream substrate" and "downstream substrate" and substitute therefore "upstream section" and "downstream section", respectively, to correct the antecedent basis thereof. Applicants have entered this amendment in order to overcome the Examiner's rejections.

This amendment to the claims is fully supported in the specification as originally filed, and thus no new matter is introduced by these amendments in accord with 35 U.S.C. Section 132. Accordingly, applicants request entry of this amendment.

### **Election/Restrictions**

The Examiner has required restriction of the application to one of the following inventions under 35 U.S.C. Section 121:

Group I. Claims 1-18, drawn to an article, classified in class 422, subclass 177.

Group II. Claims 19-39, drawn to a method for removing NO<sub>x</sub> and SO<sub>x</sub> contaminants from a gaseous stream, classified in class 423, subclass 210+ .

Group III. Claim 40, drawn to a method of forming a catalyst composite, classified in class 502, subclass 439.

The Examiner states that the inventions are distinct, each from the other because of the following reasons:

The Examiner states that inventions II and III are related as process of making and process of using the product. The Examiner states that the use as claimed cannot be practiced with a materially different product. Applicant does not understand the Examiner's position.

A restriction requirement is proper if a product and a method of using the product can be shown to be distinct inventions. The product and the method of using the product are distinct inventions if (1) the method as claimed can be practiced with another materially different product, or (2) the product as claimed can be used in a materially different method, M.P.E.P. 806.05(h). Accordingly, the Examiner's position that the use as claimed cannot be practiced with a materially different product does not support a finding that restriction is proper.

The Examiner further maintains that since the product of Group I is not allowable, restriction is proper between the method of making and method of using. The Examiner states that the product claims in Group I will be examined along with the elected invention. Applicants do not understand on what basis the Examiner concludes

that the product of Group I is not allowable. The Examiner has provided no support for the finding that the product of Group I is not allowable.

The Examiner maintains that because the inventions are distinct for the reasons given above and have acquired a separate status in the art as shown by their different classification, recognized divergent subject matter, and the search required for Group II is not required for Group III, restriction for examination purposes as indicated is proper.

During a telephone conversation between the Examiner and Mr. Richard A. Negin on 06/17/03, a provisional election was made with traverse to prosecute the invention of Groups I and III, claims 1-18 and 40. Applicants hereby affirm this election in the Response to this Office action. The Examiner has withdrawn claims 19-39 from further consideration as being drawn to a non-elected invention.

### **Drawings**

The Examiner states that the drawings have not been checked to the extent necessary to determine the presence of all possible minor errors and applicant's cooperation is requested in correcting any errors of which applicant may become aware in the drawings to comply. Applicants are not aware of any errors in the Drawings.

### **Specification**

The Examiner states that the specification has not been checked to the extent necessary to determine the presence of all possible minor errors and applicant's cooperation is requested in correcting any errors of which applicant may become aware in the specification. Applicants are not aware of any errors in the specification.

**Rejection of Claim 18 under 35 U.S.C. Section 112, second paragraph.**

The Examiner has rejected claim 18 under 35 U.S.C. Section 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. Specifically, the Examiner states that in claim 18, lines 1-2, "the upstream substrate" and "the downstream substrate" have no clear antecedent basis. Applicants' claims as amended obviate the Examiner's rejection.

As set out above, applicants have amended claim 18 to delete the word "substrate" and substitute therefore the word "section". Accordingly, the Examiner's rejection of claim 18 under 35 U.S.C. Section 112, second paragraph, should be withdrawn.

**Rejection of Claims 1-18 and 40 under 35 U.S.C. Section 102(b) as being anticipated by *Strehlau et al.***

The Examiner has rejected claims 1-18 and 40 under 35 U.S.C. Section 102(b) as being anticipated by CA 2,267,010 (*Strehlau et al.*). With respect to claims 1-3, 8-16, 18, and 40, the Examiner states that *Strehlau et al.* discloses an apparatus and a method of making the apparatus, comprising a lean burn engine 2 having an exhaust outlet; an upstream section 5 having a close coupled catalyst composite in communication with the exhaust outlet, the upstream close coupled catalyst composite comprising a first support; a first platinum group component; and a SO<sub>x</sub> sorbent component selected from the group consisting of oxides and mixed oxides of barium, lanthanum, magnesium, strontium, etc.; and a downstream section 6 comprising a

second support; a second platinum group component; and a NO<sub>x</sub> sorbent component selected from the group consisting of compounds of lithium, sodium, potassium, cesium, calcium, strontium, barium, lanthanum, etc. The Examiner further states that *Strehlau et al.* discloses that the upstream section has substantially no components adversely affecting three-way conversion under operating conditions. The Examiner further states that *Strehlau et al.* discloses that the first and second supports may be ceramic (cordierite) or metal honeycomb substrates. With respect to claims 4-7, the Examiner states that *Strehlau et al.* discloses that the first and second platinum group metal components are platinum, palladium, rhodium, ruthenium, iridium, osmium. With respect to claim 17, the Examiner states that *Strehlau et al.* discloses that the upstream and/or downstream section further comprises a zirconium component. The Examiner argues that instant claims 1-18 and 40 structurally read on the apparatus of *Strehlau et al.* Applicants traverse the Examiner's rejections.

In summary, *Strehlau et al.* does not disclose applicants' article having a catalyst composite with a close coupled upstream section and a downstream section. Applicants' close-coupled catalyst is placed close to an engine to enable it to reach reaction temperatures as soon as possible. However, during steady state operation of the engine, the proximity of the close-coupled catalyst to the engine, typically less than one foot, more typically less than six inches and commonly attached directly to the outlet of the exhaust manifold exposes the close-coupled catalyst composition to exhaust gases at very high temperatures of up to 1100°C. The close-coupled catalyst in the catalyst bed is heated to high temperature by heat from both the hot exhaust gas and by heat generated by the combustion of hydrocarbons and carbon monoxide present in the exhaust gas. In addition to being very reactive at low temperatures, the close-coupled catalyst composition should be stable at high temperatures during the operating life of the engine. (applicants' specification at page 10, lines 25-35).

Applicants invention, as set out in the claims, provides an article comprising: (A) a lean burn gasoline engine having an exhaust outlet; (B) an upstream section having a close coupled catalyst composite in communication with the exhaust outlet, the upstream close coupled catalyst composite comprising: (i) a first support; (ii) a first platinum group component; and (iii) a SO<sub>x</sub> sorbent component selected from the group consisting of oxides and mixed oxides of barium, lanthanum, magnesium, manganese, neodymium, praseodymium, and strontium; and (C) a downstream section comprising: (i) a second support; (ii) a second platinum group component; and (iii) a NO<sub>x</sub> sorbent component; wherein the upstream section has substantially no components adversely affecting three-way conversion under operating conditions.

Applicants invention, as set out in the claims, also provides a method of forming a catalyst composite having a close coupled upstream section and a downstream section which comprises the steps of: (a) forming a close coupled upstream section comprising: (i) a first support; (ii) a first platinum group component; and (iii) a SO<sub>x</sub> sorbent component selected from the group consisting of oxides and mixed oxides of barium, lanthanum, magnesium, manganese, neodymium, praseodymium, and strontium; and (b) forming a downstream section comprising: (i) a second support; (ii) a second platinum group component; and (iii) a NO<sub>x</sub> sorbent component; wherein the upstream section has substantially no components adversely affecting three-way conversion under operating conditions.

The close-coupled catalyst of the present invention has been designed to reduce hydrocarbon emissions from gasoline engines during cold starts in the presence of sulfur oxide contaminants. More particularly, the close-coupled catalyst is designed to reduce pollutants in automotive engine exhaust gas streams at temperatures as low as 350°C, preferably as low as 300°C and more preferably as low as 200°C. The close-coupled catalyst of the present invention comprises a close-coupled catalyst composition

which catalyzes low temperature reactions. This is indicated by the light-off temperature. The light-off temperature for a specific component is the temperature at which 50% of that component reacts. The catalyst composites of the present invention have an upstream section having a  $\text{SO}_x$  sorbing close coupled catalyst composite in communication with an exhaust outlet and a  $\text{NO}_x$  sorbing downstream section. The upstream section has substantially no components adversely affecting three-way conversion under operating conditions. The  $\text{SO}_x$  sorbent component in the upstream close coupled catalyst composite is selected such that release of  $\text{SO}_x$  occurs only under rich conditions where the  $\text{SO}_x$  cannot be retrapped in the downstream  $\text{NO}_x$  sorbing component. (applicants' specification at page 10, lines 8-23).

The present invention includes an article comprising a gasoline engine having an exhaust outlet, typically connected in communication to the inlet of an exhaust manifold. The close-coupled catalyst is in communication with the exhaust outlet and is typically connected in communication with the exhaust manifold outlet. The close-coupled catalyst can be connected directly to the gasoline engine outlet or exhaust manifold outlet. Alternatively, it can be connected by a short exhaust pipe, typically up to about one foot long to the exhaust outlet or exhaust manifold outlet of the gasoline engine. The close-coupled catalyst has an outlet which is connected in communication with the inlet of the downstream preferably underfloor catalytic converter. Exhaust pipes can be connected from the outlet of the close-coupled catalyst outlet and the inlet of the underfloor catalytic converter inlet. The underfloor catalytic converter has an outlet which can be connected to outlet exhaust pipes through which the exhaust gas passes from the vehicle into the atmosphere. The close-coupled catalyst comprises a close-coupled catalyst composition. The underfloor catalyst preferably comprises a  $\text{NO}_x$  trap containing ceria. (applicants' specification at page 11, lines 22-36).

The *Strehlau et al.* reference discloses a process for operating an exhaust-gas treatment unit for an internal-combustion engine which is operated during most of the operating period with lean air/fuel ratios. The exhaust-gas treatment unit includes:

a nitrogen-oxides storage catalyst with an activity window  $\Delta T_{NOX}$  between the temperatures  $T_{K,1}$  and  $T_{K,2}$  for the storage of nitrogen oxides at normalized air/fuel ratios greater than 1 and release of the nitrogen oxides at normalized air/fuel ratios less than or equal to 1 and a sulfur-desorption temperature  $T_{S,DeSOx}$  above which sulfates stored on the catalyst are decomposed at normalized air/fuel ratios less than or equal to 1; and

a sulfur trap, which is upstream of the nitrogen-oxides storage catalyst and located at a distance there from, with a sulfur-desorption temperature  $T_{S,DeSOx}$  above which sulfates stored on the sulfur trap are decomposed at normalized air/fuel ratios less than or equal to 1.

*Strehlau et al.* states that there is a temperature difference  $\Delta T_{S,K}$  between the sulfur trap and the storage catalyst, which is the difference between the exhaust gas temperature  $T_s$  measured just upstream of the sulfur trap and the exhaust gas temperature  $T_K$  measured just upstream of the storage catalyst.

The *Strehlau et al.* process includes the steps of:

(a) storage of the nitrogen oxides contained in the exhaust gas on the nitrogen-oxides storage catalyst and of the sulfur oxides on the sulfur trap at normalized air/fuel ratios greater than 1 and with exhaust gas temperatures  $T_E$  within the activity window  $\Delta T_{NOx}$ , wherein at the same time the exhaust gas temperature  $T_s$  is less than the sulfur desorption temperature  $T_{S,DeSOx}$ , and cyclic lowering of the normalized air/fuel ratio in the exhaust gas to less than 1 to release the stored nitrogen oxides;

(b) removal of sulfur from the sulfur trap after each predetermined number  $N_1$  of nitrogen-oxides storage cycles by raising the exhaust gas temperature  $T_s$  above the

sulfur desorption temperature  $T_{S,DeSO_x}$  of the sulfur trap and lowering the normalized air/fuel ratio in the exhaust gas to below 1: and

(c) cyclic repetition of steps (a) and (b).

Hence, *Strehlau et al.* does not disclose applicants' article having a catalyst composite with a close coupled upstream section and a downstream section wherein the close-coupled catalyst is placed close to an engine to enable it to reach reaction temperatures as soon as possible. Accordingly, the Examiner's rejection of claims 1-18 and 40 under 35 U.S.C. Section 102(b) as being anticipated by *Strehlau et al.* should be withdrawn.

**Rejection of Claims 1-18 and 40 under 35 U.S.C. Section 103(a) as being unpatentable over *Strehlau et al.* in view of EP 625,633.**

The Examiner has rejected claims 1-18 and 40 under 35 U.S.C. Section 103(a) as being unpatentable over *Strehlau et al.* in view of EP 625,633 (*Toyoto*). The Examiner states that *Strehlau et al.* is silent as to the specific support for the storage catalyst 6, however, *Strehlau et al.* further discloses the conventionality of providing a specific support of catalyst and SO<sub>x</sub> sorbent. The Examiner argues that *Toyoto* discloses the conventionality of providing a NO<sub>x</sub> sorbent with the specific support as claimed. The Examiner concludes that it would have been obvious to use the conventional support as disclosed in *Strehlau et al.* or *Toyoto* for supporting the NO<sub>x</sub> sorbent in the apparatus and method of *Strehlau et al.*, if not inherent therein, on the basis of its suitability for the intended use as a matter of obvious design choice, as use of such is conventional in the art and no cause for patentability here as evidenced by *Strehlau et al.* and *Toyoto*. Applicants traverse the Examiner rejections.

The *Toyota* reference discloses an exhaust purification device of an internal combustion engine provided with an exhaust passage, an NOx absorbent, an SOx absorbent, and an air-fuel ratio control means. The NOx absorbent is arranged in the exhaust passage to absorb the NOx when the air-fuel ratio of an inflowing exhaust gas is lean and, at the same time, to release the absorbed NOx when an oxygen concentration in the inflowing exhaust gas is lowered. The SOx absorbent is arranged in the exhaust passage on the upstream side of the NOx absorbent to absorb the SOx when the air-fuel ratio of the inflowing exhaust gas is lean and, at the same time, to release the absorbed SOx when the air-fuel ratio of the in-flowing exhaust gas is made rich. The air-fuel ratio control means controls the air-fuel ratio of the exhaust gas flowing into the SOx absorbent, and maintains the air-fuel ratio of the exhaust gas flowing into the SOx absorbent lean, and makes the air-fuel ratio of the exhaust gas flowing into the SOx absorbent rich, when the SOx should be released from the SOx absorbent.

As set out above, *Strehlau et al.* does not disclose applicants' article having a catalyst composite with a close coupled upstream section and a downstream section wherein the close-coupled catalyst is placed close to an engine to enable it to reach reaction temperatures as soon as possible. Since the primary reference of *Strehlau et al.* does not disclose applicant's invention, the combination of the primary reference of *Strehlau et al.* and the secondary reference of *Toyoto* similarly does not disclose applicant's article having a catalyst composite with a close coupled upstream section and a downstream section. Accordingly, the Examiner's rejection of claims 1-18 and 40 under 35 U.S.C. Section 103(a) as being unpatentable over *Strehlau et al.* in view of *Toyoto* should be withdrawn..

Obviousness of a composition or process must be predicated on something more than it would be obvious "to try" the particular component recited in the claims


or the possibility it will be considered in the future, having been neglected in the past. *Ex parte Argabright et al.* (POBA 1967) 161 U.S.P.Q. 703. There is usually an element of "obvious to try" in any research endeavor, since such research is not undertaken with complete blindness but with some semblance of a chance of success. "Obvious to try" is not a valid test of patentability. *In re Mercier* (CCPA 1975) 515 F2d 1161, 185 U.S.P.Q. 774; *Hybritech Inc. v. Monoclonal Antibodies, Inc.* (CAFC 1986) 802 F2d 1367, 231 U.S.P.Q. 81; *Ex parte Old* (BPAI 1985) 229 U.S.P.Q. 196; *In re Geiger* (CAFC 1987) 815 F2d 686, 2 U.S.P.Q.2d 1276. *In re Dow Chemical Co.* (CAFC 1988) F2d, 5 U.S.P.Q.2d 1529. Patentability determinations based on that as a test are contrary to statute. *In re Antonie* (CCPA 1977) 559 F2d 618, 195 U.S.P.Q. 6; *In re Goodwin et al.* (CCPA 1978) 576 F2d 375, 198 U.S.P.Q. 1; *In re Tomlinson et al.* (CCPA 1966) 363 F2d 928, 150 U.S.P.Q. 623. A rejection based on the opinion of the Examiner that it would be "obvious to try the chemical used in the claimed process which imparted novelty to the process does not meet the requirement of the statute (35 U.S.C. 103) that the issue of obviousness be based on the subject matter as a whole. *In re Dien* (CCPA 1967) 371 F2d 886, 152 U.S.P.Q. 550; *In re Wiaains* (CCPA 1968) 397 F2d 356, 158 U.S.P.Q. 199; *In re Yates* (CCPA 1981) 663 F2d 1054, 211 U.S.P.Q. 1149. Arguing that mere routine experimentation was involved overlooks the second sentence of 35 USC 103. *In re Saether* (CCPA 1974) 492 F2d 849, 181 U.S.P.Q. 36. The issue is whether the experimentation is within the teachings of the prior art. *In re Waymouth et al.* (CCPA 1974) 499 F2d 1273, 182 U.S.P.Q. 290. The fact that the prior art does not lead one skilled in the art to expect the process used to produce the claimed product would fail does not establish obviousness. *In re Dow Chem. Co.* (CAFC 1988) 5 U.S.P.Q.2d 1529.

The provisions of Section 103 must be followed realistically to develop the factual background against which the Section 103 determination must be made. It is

not proper within the framework of Section 103 to pick and choose from any one reference only so much of it as will support a given position to the exclusion of other parts necessary for the full appreciation of what such reference fairly suggest to one of ordinary skill in the art. The references of record fail to teach or suggest appellant's invention as a whole.

In view of the foregoing Amendment and Response, applicants request reconsideration pursuant to 37 C.F.R. Section 112 and allowance of the claims pending in this application. Applicant requests the Examiner to telephone the undersigned attorney should the Examiner have any questions or comments which might be most expeditiously handled by a telephone conference. No fee is deemed necessary in connection with the filing of this Amendment and Response. If any fee is required, however, authorization is hereby given to charge the amount of such fee to Deposit Account No. 18-1843.

Respectfully submitted,

By   
RICHARD R. MUCCINO  
Attorney For Applicant(s)  
Registration Number 32,538

Direct communications to:  
Chief Patent Counsel  
Engelhard Corporation  
101 Wood Avenue - P.O. Box 770  
Iselin, New Jersey 08830-0770  
Telephone (732) 205-6241